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I Know That I Know: Online Health Information Seeking, Self-Care and the Overconfidence Effect[1,2]

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The increasing access to online health information and the use of this information for self-medication or self-diagnosis can foster a discounting of the epistemic authority of experts, as well as an over-reliance on laypersons' expertise. However, the emerging cognitive bias—the overconfidence effect—is poorly investigated in the sociological field. This study offers a novel contribution to the role of overconfidence bias in online health information-seeking behavior and self-care practices. A cross-sectional study was conducted through an online survey on a sample of 783 Italian university students. Univariate linear regression and stepwise multiple linear regression analysis were performed on the collected data. The findings suggest that overconfidence and self-care practices are predictors of health information seeking online. The multiple linear regression model revealed that the association between overconfidence bias and online health information seeking is mediated by self-care behaviors. Therefore, the overconfidence effect influences health information seeking to the extent that the search for information is aimed at self-care practices. This study could trigger further research on implementing the overconfidence effect and self-care in theoretical models of health information seeking.

KEYWORDS: e-health literacy; health information seeking; lay-expert; overconfidence bias; self-care; trust.

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INTRODUCTION

The Internet has become one of the most frequently consulted sources of health information in all advanced countries (European Commission, Directorate-General for the Information Society and Media 2015; Wang et al. 2021). The searching, sharing, and utilization of health information online can trigger positive and negative effects which concern the doctor–patient relationship, and the patient/citizen role itself. As previous studies have shown, the proliferation of web-based health information could undermine the paternalistic and medico-centric relationship between health providers and patients, which is mainly grounded in exclusive access to the medical authority's expert knowledge (Shilling 2002; Tan and Goonawardene 2017). Access to online health information can cause tensions in the patient–physician relationship due to the misalignment of information and conflicts of opinion between experts and nonexperts. This can result in the search for a second opinion, a change in doctor or treatment, or self-diagnosis and self-medication (Tan and Goonawardene 2017). Thereby, the dissatisfaction of patients may erode the trust placed on medical experts. Although doctors have traditionally depended on extensive credibility and have been trusted by the public, there is evidence that trust in physicians has declined in many countries (Blendon et al. 2014). According to Huang et al.'s (2018) secondary data analysis on 23 countries, interviewees in countries with a high level of healthcare commodification were approximately half as likely to trust physicians.

Within the digital information environment, the expertise and credibility of medical experts are further challenged by other factors, among which is the competition from non- or pseudo-scientific sources of information and lay experts. Concerning the first, in the field of science communication, the practice of "balanced" news coverage raises many concerns because televisions, newspapers, or news websites offer scope for nonexpert voices (e.g., politicians or celebrities) to disseminate beliefs that conflict with those held by the scientific community. This is true for controversial issues such as climate change (Boykoff and Boykoff 2004) or vaccination (Catalan-Matamoros and Peñafiel-Saiz 2019; Lovari et al. 2020), about which skeptics or deniers convey information often not supported by scientific evidence. This improper equivalence between opposing positions, emphasized by a certain amount of media coverage, leads to some unexpected effects. On the one hand, accredited experts and nonexperts (such as celebrities) appear to be on the same footing and to have a similar epistemic legitimacy; on the other hand, laypersons exposed to conflicting views may underestimate the need for scientific expertise on a subject (Benegal 2018).

The resulting devaluation of expertise could fuel the emergence of lay experts, those people who form their knowledge about health matters based not only on the direct experience of a certain condition or disease (Prior 2003) but also on the information they seek, obtain, and share through traditional media, websites, social media platforms, or online health communities. As has been highlighted previously (Armstrong 2014; Kata 2012), a distinguishing feature of the postmodern paradigm of healthcare is the emergence of a new type of patient, one who is more active, informed, and knowledgeable about health issues. Social expectations related to this new type focus on the self-management and self-knowledge of patients, who are

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required to be more responsible regarding their health condition (Lupton 2016). In addition, online health information retrieval can foster self-care practices even among the healthy. A recent study by Zhang et al. (2021) on a sample of Chinese college students reported that participants' most cited reason for seeking health information on the Internet was self-care—more than 60% of the students surveyed used online health information for self-diagnosis or self-medication. Particularly, so-called "e-health information consumerism" (Seçkin 2020:2) epitomizes the shifting attitude of using web-based information to self-diagnose, or to detect and request medications or treatment—ultimately, to assume a leading role within the medical decision-making process.

ONLINE HEALTH INFORMATION AND SELF-CARE

Over the past few decades, a growing body of literature has investigated the emergence of new health consciousness in individuals, crystallized in the spreading of popular health movements such as holistic health and self-care (Crawford 1980). However, while much research has been addressing the issue of holistic health, as well as the rapid spread of complementary and alternative medicine, the sociological reflection on self-care practices—particularly in a context of wide access to health information—has been less extensive. One of the first attempts at defining self-care was by Levin and Idler, who referred to it as "those activities individuals undertake in promoting their own health, preventing their own disease, limiting their own illness, and restoring their own health. These activities are undertaken without professional assistance, although individuals are informed by technical knowledge and skills" (Levin and Idler 1983: 181).

This definition emphasizes that nonexpert individuals conduct self-care practices, using knowledge and skills acquired from their own direct experience and from whom they consider experts. Therefore, reflecting on the "social distribution of knowledge" is appropriate (Schutz 1976), namely how the knowledge "possessed differently by different individuals and types of individuals" (Berger and Luckmann 1991:60) is socialized between people and groups, and how nonexperts socially construct their knowledge. Overall, it seems that depending on the different emphasis on a form of social experience as a "source of knowledge" for nonexperts, self-care has assumed different connotations within sociological research. In the initial phase, self-care has overlapped with the disease self-management enabled by the development of patient expertise (Fox et al. 2005; Greener 2008). The epidemiological transition from acute to chronic disease has multiplied the number of medical tasks patients must perform to self-manage their condition and, thus, has boosted the public interest in self-care (Levin and Idler 1983). Patients become experts "by virtue of having experience" of illness and disease (Prior 2003: 53), and their knowledge derives from their first-hand experience with the disease, the body, and its pains (Arksey 1994), as well as from personal experimentation with drugs and medicaments (Fox et al. 2005; Monaghan 1999). Other studies have interpreted the concept of self-care into self-help (Crawford 1980), underlining the role of self-help movements in spreading "bottom-up" knowledge and care practices. The health

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knowledge that people can acquire from their fellows would derive from the collective knowledge shared in groups and based on mutual help (Ziguras 2004).

More recently, thanks to the diffusion of online health information and digital technologies, the role of the patient expert has expanded further. According to Petrakaki et al. (2018), the social role shaped by these technological changes is the "technological self-care," namely the set of expectations towards patients encouraged to adopt digital instruments (e.g., health apps, health monitoring systems, etc.) for having an active role in their health and illness management. Technological self-care would enable the production of new health knowledge that can challenge medical expertise: "this form of a health-making agency encourages a decentering of health knowledge (from medical authorities to patients) and its subsequent communalization (dissemination of patient knowledge to the broader community) with wider ramifications for the community" (Petrakaki et al. 2018: 152). As the availability of health information grows, so does the perception of people being knowledgeable about health issues and of being able to self-determine health choices for themselves and others (Seçkin 2020). Consequently, the digital environment enables self-care behaviors through the production and sharing of information, combination of self-help practices (e.g., through online health communities), self-competence on health issues generated from the exposure to a growing body of health information, and self-management of health conditions through the application of such information.

However, the democratization of health knowledge can lead to ambiguous and not always positive effects, concerning laypersons' health beliefs and behaviors. As regards health beliefs, Kata states that "with the large number of self-styled experts online, even the most respected vaccine authority's advice becomes just another opinion" (2010: 1715). Whenever expert systems lose their monopoly on knowledge and expertise becomes heavily individualized (Nowotny et al. 2001), anyone can, hypothetically, feel like an expert (Hobson-West 2003). The overestimation of one's own health knowledge, especially when rooted in misinformation, can lead people to make faulty choices. Previous studies on highly controversial issues such as pediatric vaccination reported that exposure to online sources conveying misconceptions about vaccines could affect parents' decision to vaccinate their children (Betsch et al. 2010).

THE OVERCONFIDENCE EFFECT ON HEALTH INFORMATION SEEKING AND SELF-CARE

The increasing reliance on Internet-based technologies and online information resources—as well as the democratization of health knowledge and the consequent progression of lay expert sense-making—heightens the need to accurately appraise how individuals seek health information online and what impact it has on individual attitudes and decisions. In the past two decades, a number of theoretical models have been proposed to conceptualize health information-seeking behavior: the Health Information Acquisition Model (Freimuth et al. 1989); the Comprehensive Model of Information Seeking (Johnson and Meischke 1993); the Expanded Model of Health Information Seeking Behaviors (Longo 2005); and the Planned Risk Information Seeking Model (Kahlor 2010).

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Although these models provide a relevant contribution to conceptualizing health information-seeking behavior, our research intends to evaluate some new factors that might influence this behavior and subsequently be incorporated into the models. Therefore, we relied on recent reviews and meta-analyses developed to identify predictors of health information-seeking behavior (Lalazaryan and Zare-Farashbandi 2014; Lambert and Loiselle 2007; Marton and Choo 2012; Wang et al. 2021). Three sets of factors correlated to finding health information online have been detected: (1) features of health information-seeking practices, such as type of information sources used, and scope and extent of information retrieval; (2) health outcomes related to behavior change and engagement in medical decision-making; and (3) antecedent variables, such as information seekers' demographic characteristics and psychosocial traits.

Focusing on the antecedent variables, previous studies have recognized several predictors that can affect online health information-seeking behaviors. Positive associations have been reported between health information-seeking behavior and sex, socioeconomic status (SES), and self-reported health. Specifically, women (Hassan and Masoud 2020), individuals with a high social position (Jacobs et al. 2017; Perez et al. 2016) and those with a medical condition or poorer self-reported physical and mental health (Ayers and Kronenfeld 2007; Goldner 2006) have a greater likelihood of seeking health information online. In addition, most research emphasizes the role of e-health literacy, that is the self-assessment of one's own ability to search, find, and appraise online health information (Hassan and Masoud 2020; Zhang et al. 2021).

However, faced with the vast availability of heterogeneous and often conflicting health information, people may employ different heuristic strategies to disentangle themselves and be exposed to cognitive bias. The current study focuses on a particular cognitive bias, that is, the overconfidence that people show with respect to their health knowledge. Overconfidence is a knowledge miscalibration according to which an individual's subjective confidence in their judgments is greater than their objective accuracy. This cognitive bias can be better understood by considering the Dunning-Kruger effect, which state that 'people with substantial deficits in their knowledge or expertise should not be able to recognize those deficits' (Dunning 2011: 260). In other terms, less-competent people experience a sort of "meta-ignorance", since they tend to underestimate their knowledge gaps and, consequently, overestimate the knowledge they possess. Therefore, overconfidence in one's own knowledge can be considered an unintended effect of the Dunning-Kruger effect. Several empirical investigations have attempted to demonstrate this bias, both in laboratory tests and in real-world settings. For instance, Dunning et al. (2003) asked a sample of university students to evaluate their performance after an exam, demonstrating that the students with the lowest actual scores were those who tended to overestimate their results. Instead, a systematic review of studies focused on the comparison between physicians' self-assessments of their competencies and external, objective observations of their actual competencies has revealed that the least skilled and more self-confident physicians were least accurate in their self-evaluation and more prone to overconfidence (Davis et al. 2006). Regarding the health knowledge domain, it has been found that nonexperts' overconfidence is related to anti-vaccine policy

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attitudes. As noted by Motta et al. (2018), misinformed subjects tend to overestimate their knowledge and presume that they know more than medical experts do. Moreover, this overconfidence is associated with an increasing objection to the policy of mandatory vaccination.

One could argue that the more a person overstates their knowledge, the less they will tend to look for information. However, in a scenario where more or less accurate health information is easily available to anyone, the contrary—that being exposed to information can lead one to believe they have extensive knowledge—could also be true. With a few exceptions (Anson 2018; Motta et al. 2018), the overconfidence effect is "largely unexamined" (Benegal 2018: 97), especially in the sociological field. To the best of our knowledge, limited consideration has been devoted to the overconfidence effect on searching and using health information for self-care. Considering the ever-increasing availability and exposure of people to online health information, it may be interesting to understand the relationship between searching for health information online, over-reliance on personal expertise, and utilization of health information for self-care.

More specifically, we can assume that health overconfidence may prompt people to make autonomous decisions about their own health and to adopt self-care practices by making use of online health information. The main research question is whether health information-seeking behavior is influenced by the overconfidence effect. Exposure to online information flows can encourage the belief that people can be experts about health matters; the more they seek health information, the more their undue confidence increases. Another purpose of the study was to assess the association between health information-seeking and self-care behaviors, assuming that increased information seeking correlates with greater adoption of self-care practices. In alignment with previous studies (Ayers and Kronenfeld 2007; Hassan and Masoud 2020), other research questions have been explored, such as the association between online information seeking and self-confidence in seeking health information, assuming that a sense of efficacy in information-seeking behavior can predict the adoption of such behavior. Furthermore, we expect to identify a negative relation between perceived health status and finding health information, and a positive relation between online search and SES.

METHOD

A cross-sectional study based on a quantitative online survey was conducted in nonmedical faculties of four Italian universities. The research was approved by the Ethical Committee of the University of Macerata. The data were collected from 9 April to 8 December 2019. Respondents were recruited through a convenience sampling procedure among students attending degree courses in the selected universities. After a presentation of the study's purpose, the link to the online questionnaire was shared in class with the participants using Qualtrics© software. The survey began with 968 participants, but students with missing data (N = 148; 15.2% of all respondents) and over 30 years old (N = 37; 4.0% of all respondents who finished the survey) were excluded from the analyses. The final sample included 783 students. The

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decision to study university students, that is, a young, healthy population with extensive access to the Internet, was motivated by two main reasons. First, this target allows us to identify possible new trends in social attitudes and health behaviors compared to other populations already investigated by previous research (e.g., people with a disease and their increased use of the Internet to search for health information; Chen et al. 2018; Graffigna et al. 2017). Second, previous research has revealed shortcomings in the level of health literacy skills among college students (Basch et al. 2018); thus, the focus on this population is significant to fill the gaps.

Data Collection Instrument

On a conceptual level, the questionnaire was formulated taking into account the influential variables for health information-seeking behavior identified by previous reviews and meta-analyses (Lalazaryan and Zare-Farashbandi 2014; Lambert and Loiselle 2007; Marton and Choo 2012; Wang et al. 2021), namely the following: (1) patterns of health information-seeking (sources, frequency of information retrieval, etc.); (2) use of the information and consequent health behaviors; and (3) demographic characteristics and psychosocial traits.

On a methodological level, the instruments adopted to measure the utilization of the Internet as a source of health information have been reviewed (Ayers and Kronenfeld 2007; Chen et al. 2018; Cotten and Gupta 2004; Graffigna et al. 2017; Jacobs et al. 2017; Jiang and Street 2017; Seçkin 2020; Suziedelyte 2012). Previous measures applied to assess online health information-seeking behavior did not seem entirely adequate; they tended to be limited to the information-seeking aspect and, to a lesser extent, the use of that information by individuals, such as for self-care. Some studies investigated merely whether people use the Internet as a source of health information (Cotten and Gupta 2004; Jacobs et al. 2017), and with what frequency (Ayers and Kronenfeld 2007; Graffigna et al. 2017; Suziedelyte 2012). Moreover, these studies (except for Cotten and Gupta 2004) were grounded in single-item measures to assess information-seeking behavior, although a single-item scale may raise concerns about reliability, sensitivity, and low content validity (McIver and Carmines 1981).

Other research has developed a broader conceptualization of online health-information seeking, and the scales and/or questionnaires implemented have been validated (Chen et al. 2018; Jiang and Street 2017; Seçkin 2020). Jiang and Street (2017) measured both the practices of searching for health information online and the users' experience, in terms of the ability to search and understand the information online. Nevertheless, the second dimension—the users' experience—presents a theoretical overlay with the concept of digital health literacy. The two questionnaires—the Problem-Solving in Medicine Questionnaire and the Online Health Information Utilization Questionnaire—developed by Chen et al. (2018) presented the advantage of evaluating both the search activities online, including the medical-help seeking, and the utilization of the information for the health decision making of the users. However, these instruments seem too articulated and present the risk of complicating the administration and increasing the respondent burden. Seçkin (2020) proposed the e-Health Information Consumerism scale (EHIC), composed of seven

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items, which measured the use of health information from the Internet for diagnosing, identifying treatments, purchasing medications, and deciding about health issues for oneself and others. However, the questionnaire proposes two different scales to assess information seeking and its use for self-care behavior—the abovementioned EHIC, and the e-Health Information Seeking (EHIS)—whereas we aimed to develop a single instrument.

Regarding overconfidence, we found no other validated instruments for measuring this concept, except for Motta et al.'s scale (2018), which, though, was not applicable because it focused on overconfidence regarding the causes of autism. Adoption of heterogeneous instruments to measure online information seeking may hamper the identification of reliable determinants that may influence this behavior (Anker et al. 2011). Therefore, we elaborated new scales to assess online health information seeking and the effect of overconfidence.

Measures

The questionnaire was composed of the following measures (the full questionnaire is available here: http://bit.ly/3Zb3Gl6).

Socio-Demographic Factors: Socio-demographic characteristics of the study sample were collected to assess the following characteristics. We included sex (male vs. female) and SES in our analysis. The latter was calculated as an additive score using three variables: parents' educational level, professional status, and income. For each variable, we set a score: 1 for low educational qualifications/low job profile/low or medium-low income; 2 for educational qualifications up to diploma/average job profile/average income; 3 for qualifications equal to degree or postgraduate/high job profile/medium-high or high income. The SES score was then calculated from the average of the scores. Finally, participants were classified into low (score 1–1.50), medium (1.51–2.40), and high (>2.40) SES groups.

Self-Reported Health Status: This measure refers to the following single question: 'In general, would you say that your health is excellent, very good, good, fair, or poor?' and is based on the first question of the SF-36 survey (Short Form-36 Health Survey, Jenkinson et al. 1993).

Online Self-Care Scale: The scale has been developed to measure the extent of the search for online health information and the utilization of such information for the self-care behaviors. On a theoretical level (see Introduction section), we can consider self-care practices as rooted in socially constructed knowledge in the digital environment through exposure to health information and its sharing with experts and nonexperts. Therefore, we assume that self-care combines self-help practices, self-competence on health issues, and self-management of health conditions.

The online self-care scale is composed of 10 items. Participants were asked to choose between options on a 4-point scale, with responses ranging from 'never' to 'often'. Confirmatory factor analysis highlighted two latent dimensions: first, 'information seeking', which addresses the measurement of how much participants search

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for health information online. It is based on four items: 'I entered symptoms into a search engine to find information' (Item 1); 'I used the Internet to understand better the clinical reports and/or information I received from a doctor' (Item 2); 'I used the website of the Ministry of Health or other public health institutions (e.g., health agencies) to find health information' (Item 3); and 'I searched the Internet for information on alternative treatment methods to conventional medicine' (Item 4).

The second dimension concerns self-care behaviors and measures the proactive role of the subjects regarding online self-care, that is, interacting with others (health providers and laypersons) to ask for advice, looking for alternative remedies, and self-diagnosing. This includes seven items: the aforementioned Item 4; 'I asked for advice on a health problem from ordinary (nonmedical) people on a website or social media' (Item 5); 'I asked for advice on a health problem from a doctor on a website or social media' (Item 6); 'I asked online for advice on a health problem from people or doctors who propose alternative remedies to conventional medicine' (Item 7); 'Using the information I found on the Internet, I diagnosed a physical and/or mental illness for myself or my family/friends' (Item 8); 'After searching the Internet for information on a drug, I bought it or asked my doctor to prescribe it' (Item 9); 'Using the information I found on the Internet, I used treatment alternative to conventional medicine' (Item 10).

Self-Confidence Scale: We measured the level of self-confidence in personal e-health literacy using eHEALS, an instrument scale proposed by Norman and Skinner (2006). On this scale, interviewees are asked to self-evaluate their individual skills at using e-health information using eight items scored on a 5-point Likert scale. According to some prior research, the cut-off for high e-health literacy was established at 26 (Richtering et al. 2017). In our study, we use the Italian validation proposed by Diviani et al. (2017).

Overconfidence Scale: The overconfidence scale is composed of four items measured on a scale from 1 ('Completely disagree') to 7 ('Completely agree'). The items explore the respondent's attitude to overestimating their health knowledge. The following items are used: 'Using the Internet, I can get more health information than I can get from doctors' (Item 1); 'Using the health information I find on the Internet, I feel as if I know more than doctors' (Item 2); 'The health information I find on the Internet allows me to take a critical look at conventional medicine' (Item 3); 'The health information I find on the Internet gives me the opportunity to make my own health decisions, even without consulting a doctor' (Item 4).

ANALYSIS

The descriptive statistics for the respondents' socio-demographic characteristics were expressed as mean and standard deviation (SD) for continuous variables and as absolute frequency (column percentage) for categorical variables. Pearson's Chi-squared test (for cell frequency $n \geq 5$) and Fisher's exact test (for cell frequency $n < 5$) were performed to test independence, and unpaired t-test was used to assess mean differences between groups. The Kolmogorov–Smirnov test was used to assess

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normality and, if violated, nonparametric Mann–Whitney U tests were conducted. The Kruskal–Wallis test was used to compare three or more unmatched groups.

For scale measures (information-seeking, self-care, self-confidence, overconfidence), Cronbach's alpha was used to calculate the internal consistency of items within each factor. In general, Cronbach's alpha of .7 was taken as an indication of good internal consistency (Streiner et al. 2014). Some authors have pointed out that an alpha of .6 is also acceptable (De Vellis 1991; Peterson and Kim 2013). Pearson's correlation coefficient was used to measure the construct validity and the association between information-seeking, self-care, self-confidence, and overconfidence. A univariate linear regression analysis was used to assess a direct relationship between each predictor and information-seeking. Controlling for sex, a stepwise multiple linear regression model was used to estimate the effect of self-confidence, overconfidence, and self-care on information-seeking. Multicollinearity was tested using the variation inflation factor. All statistical tests were two-sided, with a significance level set at $p < .05$. Analyses were performed using the R environment.

RESULTS

The sample consisted of 783 participants (33.0% male, 67.0% female). The mean age of students was $M = 20.46$ (SD = 1.907). The nationality of almost all the participants was Italian (96.8%), and most studied at the University of Macerata (40.2%), followed by the University of Urbino Carlo BO (22.5%), Cattolica University of Milan (19.5%), and University of Cagliari (17.8%). Of the total number, 18.5% were classified as lower SES, 69.9% as medium SES, and 11.6% as high SES. The analysis of the results related to the secondary school attended showed that 65.8% of the respondents graduated from a high school, 24.5% from a technical institute, and 9.7% from a professional institute. Table 1 shows the sample characteristics.

Internal consistencies were excellent for the self-confidence scale ($\alpha = .91$), good for self-care ($\alpha = .73$) and overconfidence ($\alpha = .71$), and discrete for information-seeking ($\alpha = .65$). Principal component analysis of the whole sample confirmed the unidimensionality of the scales. Table 2 shows the mean and SD of each scale.

As shown in Table 3, the Pearson correlation indicated a significant positive association between information-seeking, self-care, self-confidence, and overconfidence. In particular, a significant positive correlation was found between information-seeking and self-care ($r = .58$, $p < .001$) and between self-care and overconfidence ($r = .43$, $p < .001$). Results also showed a positive but less intense association between information-seeking and self-confidence ($r = .32$, $p < .001$).

The univariate linear regression analysis confirms that overconfidence ($\beta = .18$, $p = <.001$, Adjust-$R^2 = .069$), self-care ($\beta = .86$, $p = <.001$, Adjust-$R^2 = .331$) and self-confidence ($\beta = .02$, $p = <.001$, Adjust-$R^2 = .102$) have a direct relationship with information-seeking. To test whether the joint effect of overconfidence, self-confidence, and self-care scores is explanatory of information-seeking, we ran a multiple linear regression model. Thus, in the stepwise multiple linear regression model (Adjust-$R^2 = .405$), we reported that sex (male vs. female) ($\beta = .29$, $p < 0.001$), self-

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Table 1. Socio-Demographic Characteristics of Participants

	M	SD
Age	20.46	1.91
	N	%
Sex		
Male	258	33.0
Female	525	67.0
Citizenship		
Italian	752	96.8
Other citizenship	25	3.2
University		
Catholic University of Sacred Heart	153	19.5
University of Cagliari	139	17.8
University of Macerata	315	40.2
University of Urbino Carlo BO	176	22.5
Diploma		
High school	515	65.8
Technical school	192	24.5
Professional school	76	9.7
Socioeconomic status		
Low	145	18.5
Medium	547	69.9
High	91	11.6

Table 2. Descriptive Statistics of Scale Variables

	M	SD
Info-seeking	2.27	0.66
Self-care	1.42	0.43
Self-confidence	3.79	0.44
Over-confidence	2.01	0.98

Table 3. Correlation Matrix for the Scale Variables

	Information-seeking	Self-care	Self-confidence
Information-seeking	—		
Self-care	.576**	—	
Self-confidence	.321**	.251**	—
Over-confidence	.264**	.430**	.339**

Significance code: *$p < .01$; **$p < .05$.

confidence ($\beta = .01$, <.001), and self-care ($\beta = .75$, <.001) positively influence information-seeking (Table 4). Even with a low regression coefficient, overconfidence is no longer significantly associated with information-seeking in a multivariate model ($\beta = -.02$, $p = .323$). For this reason, proceeding by steps, we found that the relationship between overconfidence and information-seeking was mediated by self-care.

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Table 4. Multiple Linear Regression Model for Information-Seeking

	β	Std. error	p-Value
(Intercept)	.64	.08	<.001
Gender (male vs. female)	.29	.04	<.001
Self-confidence score	.01	.00	<.001
Overconfidence score	−.02	.02	.323
Self-care score	.75	.05	<.001

Finally, to test whether there was a difference in self-care and information-seeking scores for perceived health status, we performed the unpaired t-test, which revealed significant differences in participants who had declared to be in poor or good health (Fig. 1). Panel B of Fig. 1 shows that subjects who asserted having a poor perceived health status registered significantly higher scores of information-seeking (M = 2.48, SD = 0.66) compared to participants who declared excellent, very good, or good health (information-seeking: M = 2.25, SD = 0.65). Because self-care was not normally distributed into perceived health status groups, a Mann–Whitney U test was applied.

Furthermore, panel A shows that students in bad health reported significantly higher scores of self-care (M = 1.58, SD = 0.51) compared to students in good health (M = 1.40, SD = 0.42, panel A). We interpreted these findings asserting that self-reported health status is a predictor of information-seeking and self-care: The worse the perceived health status, the more participants search for health information online, and the more they self-care to find a cure and recover their well-being.

Figure 2 reports the results of the nonparametric analysis of variance, indicating that there were significant differences in information-seeking (p = .0012, panel A) and self-care scores (p = .0250, panel B) between different SES levels. In particular, no significant differences were found between a 'medium' and 'high' level of SES in information-seeking and self-care scores, while students with lower SES were more prone to researching information online and practicing self-care than students with 'medium' and 'high' SES.

DISCUSSION

In a rapidly changing communication landscape, experts' and nonexperts' roles are shifting. The latter claim to be knowledgeable and competent enough to make health-related decisions for themselves. Access to health information has contributed to this change through digital communication technologies, which have "blown away the doors and walls" of medical knowledge (Gray 1999: 1552). Consequently, the epistemic authority of expert systems is questioned, both endogenously due to the profound uncertainty that distinguishes modern science, particularly medicine (Alaszewski and Brown 2007; Nowotny et al. 2001), and exogenously as a result of the emergence of the lay expert. Previous studies have elaborated on the concept of lay expertise, referring to patients who gain expertise through the living experience of their illness (Prior 2003). In postmodern medicine, the concept can be extended to nonpatients as well, assuming that people who have increased access to health

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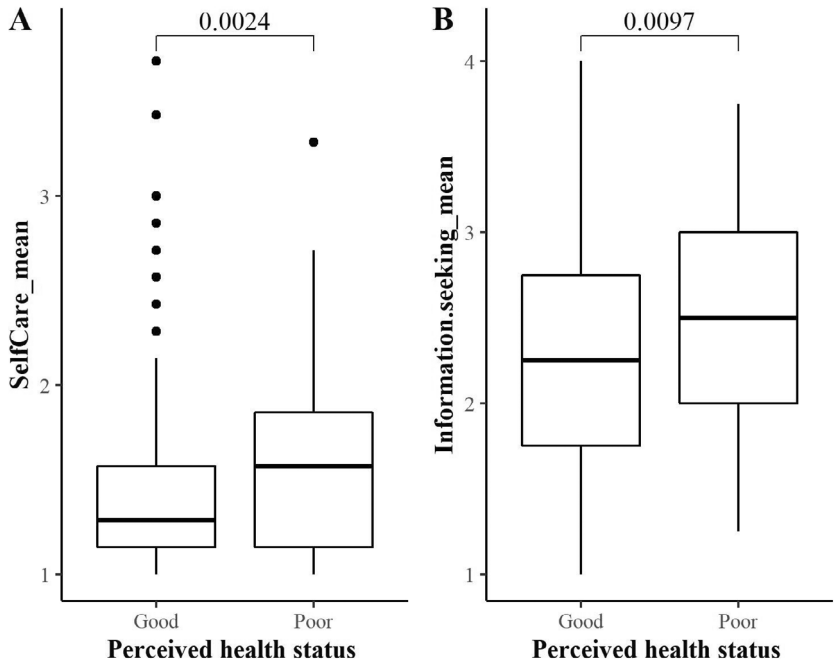

Fig. 1. Box plots for perceived health status in relationship to self-care (panel A) and information-seeking (panel B).

information (especially through digital platforms) shape their health knowledge and build up their own expertise. In fact, several studies have shown that web-based health information is increasingly being used for self-diagnosis or self-care (Seçkin 2020; Zhang et al. 2021). Nonetheless, lay expertise can be affected by cognitive bias, such as the overconfidence effect, in which individuals perceive an undue confidence in their health knowledge regardless of whether their knowledge is validated. Therefore, the general purpose of the current study was to understand the relationship between the overconfidence effect and health-related behaviors, that is, online health information seeking and self-care practices.

Univariate linear regression analysis indicates that overconfidence and self-care practices are predictors of online health information seeking. However, on performing a multiple linear regression model, one unanticipated finding was that the effect of overconfidence on health information seeking was mediated by self-care practice. In other terms, the self-perception of owning certain expertise appeared to be a predictor of self-care behaviors; in turn, the two variables predicted online health information seeking. The overconfidence effect influences health information seeking to the extent that the search for information online is aimed at implementing self-care practices. A possible explanation for the indirect relationship between overconfidence and health information seeking may be that the overconfidence bias instills in people the belief that they can be responsible for their own health and that they have sufficient expertise to make their own choices about health. Therefore, overconfident

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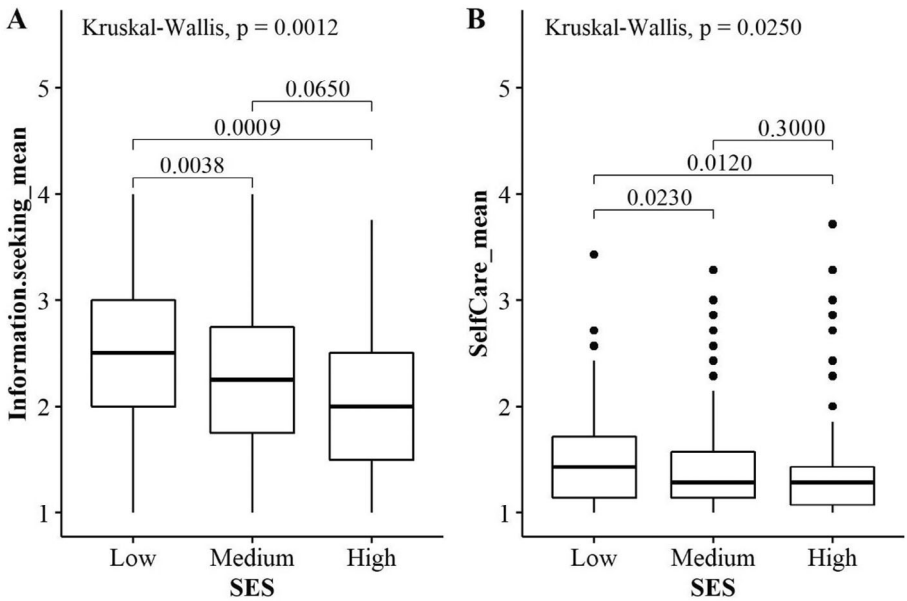

Fig. 2. Box plots for socioeconomic status (SES) level in relationship to information-seeking (panel A) and self-care (panel B).

subjects embrace self-care practices by increasing their searches for health information online.

These results corroborate those of Zhang et al.'s (2021) study on Chinese university students, in which the majority of the respondents (67.6%) were intent on self-medicating without the guidance of a physician. In addition, students who felt more confident in their ability to judge the evidence level of online health information were more likely to seek information on drug use (OR = 3.1, 95% CI, 1.9–5.0) and to self-diagnose (OR = 2.2, 95% CI, 1.6–3.1) (Zhang et al. 2021:4). In certain individuals, online health information may trigger the belief that they are more knowledgeable than they actually are and, as a result, they may discount expertise and make their own health decisions. As shown in the controversies between parents and medical experts on pediatric vaccinations (Kata 2012), the emergence of lay expertise fueled by misleading health information retrieved online may have risky consequences for citizens, from skepticism towards scientific experts and legitimation of health misinformation, to the adoption of unhealthy choices.

Other studies have identified a positive association between e-health literacy and online information seeking (Hassan and Masoud 2020; Zhang et al. 2021). Our results also confirm this correlation, as the univariate linear regression showed a direct relationship between self-confidence (i.e., the perceived ability to search, find, and evaluate online health information) and information-seeking behavior. However, it should be noted that previous studies have shown a limited correlation between perceived skills in information seeking through the Internet and actual performance on web-based health-related tasks (van der Vaart et al. 2011). Investigating

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the relationship between self-confidence and overconfidence in finding health information online, it was observed that the relation was not significant. Likely, overconfidence about health matters does not depend directly on the self-perception of being skilled in searching for information.

Other key findings relate to the role of other individual factors in seeking information online and using it for self-care. We examined the role of SES; contrary to our expectations as well as the results of other research (Jacobs et al. 2017; Perez et al. 2016), it was observed that both self-care practices and information seeking were associated with lower SES. This result can be attributed to the homogeneity of the sample surveyed, as university students tend to come from favorable socioeconomic backgrounds (OECD 2010). The parents of Italian graduates hold a higher educational level (30.9% of Italian graduates have at least one parent with a college degree, compared with an average of graduates in the population aged 45–64 of 14.1% among men and 16.1% among women), as well as a higher socioeconomic position (22.3% of Italians graduated come from upper-class families) (Alma-Laurea 2022; ISTAT 2022). Therefore, although among our sample some variation may be detected, differences related to the social position may be mitigated. Previous investigations have found that personal background factors can influence Internet access but have a limited predictive capacity regarding the search for health information on the Internet (Brodie et al. 2000; Tustin 2010).

Consistently to previous investigations (Ayers and Kronenfeld 2007; Goldner 2006), online health information-seeking behavior is negatively associated with perceived health status. The search for information by those who perceive their health to be worse could be explained by the need to obtain information about their medical condition. However, this association has been differently interpreted by the so-called 'lifestyle paradox' (Deetjen 2017). In healthy populations, such as young people, the perception of personal health status may be lower than it actually is because the judgment may focus on other aspects not strictly related to having a disease (e.g., fitness, body weight, or nutrition). Through the theories of reference groups and agenda setting, Deetjen (2017) highlighted the Internet's role in fueling the lifestyle paradox. On the one hand, the Internet increases the audience of social reference groups to which people are exposed and with which they compare themselves. A continuous comparison with people involved in healthy lifestyles could affect the evaluation of one's own health. On the other hand, the intense emphasis on healthy lifestyles spread through the Internet and social media plays a role in the selection and promotion of certain idealized lifestyles to which people should aspire.

Our results also indicate that those who perceive a worse health condition tend to engage in self-care behaviors. Probably, in young people, the lifestyle paradox engenders a continuous comparison with people who adopt healthy lifestyles, triggering both a distorted perception of one's health status and the adoption of self-care practices.

Therefore, the massive dissemination of health-related information online can influence the perceptions and behaviors concerning health. This study found that people who perceive high confidence in their expertise tend to adopt self-care behaviors and, in turn, search for more health information and advice on the Internet. Regardless of the accuracy of their knowledge (which the current study does not investigate), perceiving themselves to be as knowledgeable as a doctor (or even more)

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predicts self-care and increased information-seeking behavior. Social psychologists have investigated the overconfidence effect as an individual response to exposure to Internet-based information. The use of an external source of knowledge, such as the Internet, can produce metacognitive bias (overconfidence), at least in two ways: "not being able to accurately judge information and being overconfident in the information that was selected" (Dunn et al. 2021: 7–8).

However, what is of interest to sociology concerning cognitive processes that are elaborated individually (whether beliefs, emotions, heuristics, and bias) such as overconfidence is not so much the subjective mechanisms that intervene, but the fact that psychological responses "do not develop in a vacuum" (Tierney 1999: 226), and they can be treated as a systemic social reality (Lewis and Weigert 1985). In other words, the overconfidence bias occurs in a social and cultural context in which trust in physicians is declining, and medical experts no longer have a monopoly on knowledge. The production of health knowledge is becoming more extensive and diversified, but this democratization implies an unexpected consequence, that is, the crisis of the epistemic authority of experts. Nowadays, the question "who is an expert" can elicit heterogeneous answers as heterogeneous as the social distribution of health knowledge. Relying on a mix of professional and nonprofessional sources of knowledge, the emerging lay expertise can fuel self-care practice among both people with a condition and healthy people. However, if "trust is a heuristic for competence" (Benegal 2018: 96), that is, individuals with a high level of institutional trust tend to seek the advice of experts, then overconfidence could be a heuristic for skepticism and distrust towards experts. Overconfidence can be a major concern due to the potentially harmful effects of the increasing access to and (not always accurate) sharing of health information. As reported by Motta et al. (2018), excessive reliance on personal expertise could be hazardous as it is mostly misinformed individuals who appear to be subject to the overconfidence effect. Additionally, EHIC is found to be a predictor of health problems and adverse effects, such as worry and anxiety (Seçkin 2020). Instead, intellectual humility, namely a general awareness of the fallibility of one's knowledge, is negatively associated with anti-scientific beliefs, such as anti-vaccination attitudes (Huynh and Senger 2021).

Therefore, if the democratization of health information can empower citizens and strengthen their ability to make informed decisions about health, such power must necessarily be supported by increased health literacy (Parker and Ratzan 2019) and trustworthy information. Some recent studies have highlighted the relevant role of public sector communication as a way to provide and sustain a coordinated response to health and science issues (OECD 2020). As Lewnard and Lo (2020) state, fully transparent, 'fact-based communication' can preserve the public's trust and confidence in information sources and their credibility.

CONCLUSION

The current study can have implications for the advancement of theoretical models on online health information-seeking behaviors as well as for public health and health communication interventions. Concerning the first aspect, since no

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theoretical model considers the impact that the overconfidence effect could have on the online search for information, this study represents a first attempt to assess this effect. Moreover, assuming that an increased search for health information online can affect the adoption of self-care practices, another purpose of the study was to assess the association between health information seeking and self-care behaviors. As in the case of the overconfidence effect, self-care is not included in the theoretical models we examined. However, self-care seems to be a common activity among individuals who search for information on the Internet, especially the youth.

From a public health perspective, self-care practices supported by misleading information can lead people to adopt risky behaviors and compromise their health. This study could trigger further research in self-care and enable the development of educational programs to raise awareness of these risky behaviors, particularly in young people.

The generalizability of these findings is subject to certain limitations. First, a cross-sectional study cannot identify conclusive causal inference. Second, the convenience sample of university students involved in the investigation is nonprobabilistic and homogeneous in terms of socio-demographic characteristics, so that cohort differences cannot be detected. Third, our study lacks evaluation of some significant variables that can be discriminant for identifying antecedent factors of overconfident individuals, such as the level of trust in medicine and medical experts or the contiguity to misinformation sources or nonexperts sustaining controversial thesis. Moreover, within the questionnaire, we did not consider a nonbinary option for the question on sex, and this may have limited both the participation of some respondents and data analysis concerning that category.

Further research will be needed, however, to investigate what kind of information can lead to overconfidence, to confirm whether individuals who overestimate their own health knowledge and practice self-care are also more misinformed, as well as to assess whether being skeptical of medicine or distrustful towards experts' epistemic authority may be a predictor of overconfidence bias.

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